AF/3743

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Date: 6-25-03 Virginia A. Olszewski

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:			
Applicant(s):	Ramkumar Subramanian, *et al.*	Examiner:	Ljiljana V. Ciric
Serial No:	09/707,413	Art Unit:	3743
Filing Date:	November 6, 2000		

Title: SYSTEM FOR RAPIDLY AND UNIFORMLY COOLING RESIST

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Dear Sir:

Applicants submit this brief in triplicate in connection with an appeal of the above-identified patent application. The Commissioner is authorized to charge the fee of $320.00 associated with this brief to Deposit Acct. No. 50-1063.

I. Real Party in Interest (37 C.F.R. § 1.192(c)(1))

The real party in interest in the present appeal is Advanced Micro Devices, Inc., the assignee of the present application.

II. Related Appeals and Interferences (37 C.F.R. § 1.192(c)(2))

Appellants, appellants' legal representatives, and/or the assignee of the present application are not aware of any appeals or interferences which will directly affect, or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. Status of Claims (37 C.F.R. § 1.192(c)(3))

Claims 1-21 are pending in the application. The rejection of claims 1-8 and 20 is appealed.

IV. Status of Amendments (37 C.F.R. § 1.192(c)(4))

No claim amendments have been entered for purposes of the appeal, however amendments to the claims were proposed by the Applicants to resolve the Examiner's 35 USC §112, 2nd paragraph rejections in Applicants' REPLY TO FINAL OFFICE ACTION DATED JANUARY 6, 2003.

V. Summary of Invention (37 C.F.R. § 1.192(c)(5))

The present invention relates to a system that facilitates rapidly and uniformly cooling resist-coated wafers. Resist-coated wafers are rapidly and uniformly cooled by a fluid that has been cooled through the Joule-Thompson effect (p. 3, ll. 15-16). Fluid from a high pressure reservoir is vented into a chamber that contains the substrates (p. 3, ll. 16-17). By varying the pressure difference between the reservoir and the chamber, the temperature of the cooling fluid entering the chamber can be controlled (p. 3, ll. 17-19). By also controlling the flow rate through the chamber, the average temperature difference between the fluid in the chamber and the substrates may be limited, whereby more uniform cooling is obtained (p. 3, ll. 19-22). While the

chamber pressure is lower than that in the high pressure reservoir, the chamber pressure may still be substantially greater than atmospheric (p. 3, ll. 22-24). An elevated chamber pressure raises the specific heat and residence time of the fluid in the chamber, which also promotes uniform cooling (p. 3, ll. 25).

In particular, the subject invention provides for a cooling system 100. System 100 includes high pressure reservoir 110, inlet valve 140, chamber 180, outlet valve 220, and controller 150 (p. 5, ll. 10-11). One or more coated substrates 190 are cooled by venting fluid from high pressure reservoir 110 into chamber 180, which contains substrates 190 (p. 5, ll. 11-13). Fluid is vented into chamber 180 through inlet valve 140 and released through outlet valve 220 to exhaust 240, whereby a continuous flow of cooling fluid and constant pressure may be maintained within chamber 180 (p. 5, ll. 13-16).

Controller 150 monitors the cooling process through substrate temperature sensor 250 and controls the process by manipulating inlet valve 140 and outlet valve 220 (p. 5, ll. 16-18). Additional information may be provided to controller 150 by inlet valve 140, outlet valve 220, flow meter 230, reservoir fluid temperature sensor 260, chamber inlet temperature sensor 270, and chamber exhaust temperature sensor 280 (p. 5, ll. 18-21). This information may be used by controller 150 to maximize the cooling rate while limiting temperature variations within and among substrates 190 (p.5, ll. 23).

Substrates 190 are cooled by venting fluid from high pressure reservoir 110 into chamber 180 through inlet valve 140 (p. 6, ll. 20-21). According to one aspect of the invention, the pressure drop is at least about 10 bar (p. 6, ll. 22-23). Reservoir 100 is in fluid communication with chamber 180 through coupling 120. Coupling 120, or another part of the system, may include a means of excluding particles from the fluid stream. (p. 6, ll. 29-30).

Inlet valve 140 and outlet valve 220 can be adjusted independently to separately control the flow rate of cooling fluid through chamber 180 and the pressure drop across inlet valve 140 (p. 8, ll. 9-11). The pressure drop 140 affects the temperature of the cooling fluid as it enters chamber 180 (p. 8, ll. 11-12). Therefore, inlet valve 140 and outlet valve 220 can be used to independently control two parameters, such as the temperature of the cooling fluid as it enters chamber 180 and the flow rate of cooling fluid through chamber 180 (p. 8, ll. 12-15).

VI. Statement of the Issues (37 C.F.R. § 1.192(c)(6))

A. Whether Examiner's refusal to enter the proposed amendments was proper; and whether the finality of the office action was premature;

B. Whether claims 1-4, 7, and 8 are unpatentable under 35 U.S.C. §102(b) as being anticipated by Nishizawa *et al.* (U.S. 6,464,793 B1);

C. Whether claims 1-6 are unpatentable under 35 U.S.C. §102(b) as being anticipated by Kazama *et al.* (U.S. 5,567,267);

D. Whether claims 1-4 and 7 are unpatentable under 35 U.S.C. §102(b) as being anticipated by Krueger (U.S. 5,131,460); and

E. Whether claims 1-4 are unpatentable under 35 U.S.C. §102(b) as being anticipated by Sikes (U.S. 5,709,262).

V. Grouping of Claims (37 C.F.R. § 1.192(c)(7))

For the purposes of this appeal only, the claims are grouped as follows:

Claims 1-8 stand or fall together.

VI. Argument (37 C.F.R. § 1.192(c)(8))

A. Examiner's Refusal to Enter the Proposed Amendments to Claims 1-8; Finality of Office Action is Premature

In Office Actions dated July 16, 2002 and January 6, 2003, claims 1-8 were rejected under 35 USC §112, 2nd paragraph, for omitting essential structural cooperative relationships of elements. In addition, claim 1 was rejected on the basis that "adapted to receive" was indefinite. In response the Examiner's 112, 2nd paragraph rejections, Applicants amended the claims as follows:

> 1. (Currently Amended) A system for cooling coated semiconductor substrates, said system comprising:
>
> a chamber ~~adapted to receive~~ for receiving at least one coated semiconductor substrate;

a coupling coupled to the chamber and a fluid reservoir for placing the chamber in fluid communication with ~~a~~ the fluid reservoir;

an inlet valve attached to the coupling for controlling a flow of cooling fluid between the fluid reservoir and the chamber, wherein the pressure drop across the inlet valve is at least about 10 bar; and

a controller coupled to the inlet valve for controlling the inlet valve.

2. (Cancelled)

3. (Original) The system of claim 2 wherein the pressure drop across the inlet valve is at least about 100 bar.

4. (Currently Amended) The system of claim 1 wherein the controller controls the temperature of the cooling fluid at a point within the chamber.

5. (Currently Amended) The system of claim 1 further comprising an outlet valve for controlling ~~the~~ a flow of cooling fluid out of the chamber, wherein the controller also controls the outlet valve.

6. (Currently Amended) The system of claim 5 wherein the controller controls the rate of cooling fluid flow through the chamber.

7. (Currently Amended) The system of claim 1 wherein ~~the~~ cooling fluid entering the chamber from the reservoir substantially mixes with fluid already in the chamber before contacting the ~~substrates~~ at least one semiconductor substrate.

8. (Currently Amended) The system of claim 7 further comprising a baffle, wherein the cooling fluid flowing into the chamber is directed against the baffle.

Accordingly to §706.07(a) of the MPEP, "a second or any subsequent action on the merits in **any application** or patent involved in reexamination should not be made final if it includes a rejection, on prior art not of record, of any claim amended to include limitations which should

reasonably have been expected to be claimed... For example, one would reasonably expect that a rejection under 35 U.S.C. §112 for the reason of incompleteness would be replied to by an amendment supplying the omitted element."

Claims 1-8 were rejected on newly cited art in the Final Office Action dated January 6, 2003. However, the amendments made to the claims in the previous Reply to Final Office Action should have been reasonably expected as they were made in response to a rejection under 35 U.S.C. §112. Accordingly, it is submitted that the finality of the Office Action was premature and that the amendments to the claims should have been entered. Furthermore, such amendments (*e.g.*, supplying the omitted elements) are fully supported by the specification. Thus, the search performed by the Examiner should have included the "omitted elements."

The Examiner contends that Applicants have misquoted this section of the MPEP, stating that it applies only to applications undergoing reexamination (*see* Paper No. 16). Applicants respectfully disagree. The statement out of this section is meant to be applied to two separate items: (1) any application and (2) a patent undergoing reexamination. Furthermore, patents – and not applications – are subject to reexamination. Applicants submit that the Examiner's interpretation of §706.07(a) is inaccurate at least in view of MPEP §2211, which states that "under 37 CFR 1.510(a), any person may, at any time during the period of enforceability of a patent, file a request for reexamination." Thus, §706.07(a) is intended to apply to any application *as well as* any patent undergoing reexamination.

In view of the foregoing, reversal of the finality and entry of the proposed amendments are respectfully requested.

B. Rejection of Claims 1-4, 7, and 8 Under 35 U.S.C. §102(b)

Claims 1-4, 7, and 8 stand rejected under 35 U.S.C. §102(b) as being anticipated by Nishizawa *et al.* Given that the amendments are entered with respect to claims 1-8 (*e.g.*, cancellation of claim 2 and amendments to claims 1, 3-5, and 7-8), reversal of the rejection is respectfully requested for at least the following reasons.

i. Nishizawa *et al.* fails to disclose and teach each and every element of amended claims 1-4, 7, and 8 in the present invention; therefore,

Nishizawa *et al.* does not anticipate the present invention to one ordinarily skilled in the art.

> For a prior art reference to anticipate, 35 U.S.C. §102 requires that "each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950 (Fed. Cir. 1999) (*quoting Verdegaal Bros., Inc. v. Union Oil Co.*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)).

Nishizawa *et al.* does not disclose a cooling system which includes an inlet valve attached to a coupling for controlling a flow of *cooling fluid* between the fluid reservoir and the chamber, *wherein the pressure drop across the inlet valve is at least about 10 bar*, as recited in claim 1. Applicants found that by varying the pressure difference between the fluid reservoir and the chamber, the temperature of the cooling fluid entering the chamber can be controlled. In contrast, Nishizawa *et al.* is directed to a semiconductor crystal growth apparatus suited for forming monocrystalline growth layers. Nozzles 4 and 5 are employed in Nishizawa *et al.* for introducing gaseous compounds containing III and V group elements. Nozzles 4 and 5 are provided with on-off valves 6 and 7 for controlling the introduced amounts of gaseous compounds. In the Final Office Action dated January 6, 2003 (*see* Paper No. 12), the Examiner relies on the on-off valves 6 and 7 of Nishizawa *et al.* as being equivalent to the claimed inlet valve. However, Nishizawa *et al.* does not disclose that on-off valves 6 and 7 include a pressure drop of at least about 10 bar.

Therefore, because Nishizawa *et al.* does not disclose each and every element set forth in claim 1, Nishizawa *et al.* does not anticipate claim 1. Reversal of this rejection and allowance of claim 1 and claims 3-8, which depend therefrom are respectfully requested.

C. Rejection of Claims 1-6 Under 35 U.S.C. §102(b)

Claims 1-6 stand rejected under 35 U.S.C. §102(b) as being anticipated by Kazama *et al.* Given that the amendments are entered with respect to claims 1-5 (*e.g.*, cancellation of claim 2 and amendments to claims 1 and 3-5), reversal of the rejection is

respectfully requested for at least the following reasons.

i. **Kazama *et al.* fails to disclose and teach each and every element of claims 1-6 in the present invention; therefore, Kazama *et al.* does not anticipate the present invention to one ordinarily skilled in the art.**

Kazama *et al.* does not disclose a cooling system which includes an inlet valve attached to a coupling for controlling a flow of *cooling fluid* between the fluid reservoir and the chamber, *wherein the pressure drop across the inlet valve is at least about 10 bar*, as recited in claim 1. Rather Kazama *et al.* is directed to a susceptor of a plasma etching apparatus arranged on a heater fixing frame. The Examiner relies on valve 29, or alternatively, valve 56 of Kazama *et al.* as being equivalent to the claimed inlet valve. However, there is nothing in Kazama *et al.* which discloses that either valve 29 or valve 56 include a pressure drop of at least about 10 bar.

Hence, since Kazama *et al.* does not disclose each and every element set forth in claim 1, Kazama *et al.* does not anticipate claim 1. Reversal of this rejection and allowance of claim 1 and claims 3-6, which depend therefrom, are respectfully requested.

D. Rejection of Claims 1-4 and 7 Under 35 U.S.C. §102(b)

Claims 1-4 and 7 stand rejected under 35 U.S.C. §102(b) as being anticipated by Krueger. Given that the amendments are entered with respect to claims 1-4 and 7 (*e.g.*, cancellation of claim 2 and amendments to claims 1, 3-5, and 7), reversal of the rejection is respectfully requested for at least the following reasons.

i. **Krueger fails to disclose and teach each and every element of claims 1-4 and 7 in the present invention; therefore, Krueger does not anticipate the present invention to one ordinarily skilled in the art.**

In particular, Krueger does not disclose a cooling system which includes an inlet valve attached to a coupling for controlling a flow of *cooling fluid* between the fluid reservoir and the chamber, *wherein the pressure drop across the inlet valve is at least about 10 bar*, as recited in claim 1. The Examiner relies on valves 78 or 42 of Krueger as being equivalent to the claimed inlet valve. Valves 78 and 42 are employed to cause gas to flow from a reservoir 46 into a

chamber 12. However, Krueger describes the gas as being heated or cooled as it flows through and over the surface of a heating or cooling plate 30. Thus, Krueger does not disclose that the valves 78 and 42 control a flow of *cooling* fluid between the reservoir 46 and the chamber 12. Moreover, there is nothing in Krueger which discloses that either valve 78 or valve 42 include a pressure drop of at least about 10 bar.

Hence, because Krueger does not disclose each and every element set forth in claim 1, Krueger does not anticipate claim 1. Reversal of this rejection and allowance of claim 1 and claims 3-4 and 7, which depend therefrom, are respectfully requested.

E. Rejection of Claims 1-4 Under 35 U.S.C. §102(b)

Claims 1-4 stand rejected under 35 U.S.C. §102(b) as being anticipated by Sikes. Given that the amendments are entered with respect to claims 1-4 (*e.g.*, cancellation of claim 2 and amendments to claims 1 and 3-4), reversal of the rejection is respectfully requested for at least the following reasons.

i. Sikes fails to disclose and teach each and every element of claims 1-4 in the present invention; therefore, Krueger does not anticipate the present invention to one ordinarily skilled in the art.

Sikes does not disclose a cooling system which includes an inlet valve attached to a coupling for controlling a flow of cooling fluid between the fluid reservoir and the chamber, *wherein the pressure drop across the inlet valve is at least about 10 bar*, as recited in claim 1. Sikes describes an electrically activated valve 38 employed to allow coolant in a first conduit 34 to flow through the valve and into energy source 16. However, there is no mention in Sikes of a pressure drop across the valve of at least about 10 bar.

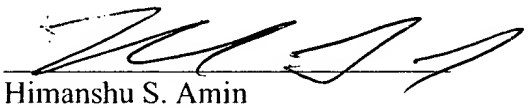
Since Sikes does not disclose each and every element set forth in claim 1, Sikes can not anticipate claim 1. In view of the foregoing, reversal of the rejection and allowance of claim 1 and claims 3-4, which depend therefrom, are respectfully requested.

VII. Conclusion

For at least the above reasons, the claims currently under consideration are believed to be patentable over the cited reference. Accordingly, it is respectfully requested that the rejections of claims 1-8 be reversed.

If any additional fees are due in connection with this document, the Commissioner if authorized to charge those fees to Deposit Account No. 50-1063.

Respectfully submitted,
AMIN & TUROCY, LLP



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VIII. Appendix of Claims (37 C.F.R. § 1.192(c)(9)) – without the proposed amendments

1. A system for cooling coated semiconductor substrates, said system comprising:

a chamber adapted to receive at least one coated semiconductor substrate;

a coupling for placing the chamber in fluid communication with a fluid reservoir;

an inlet valve attached to the coupling for controlling a flow of fluid between the fluid reservoir and the chamber; and

a controller for controlling the inlet valve.

2. The system of claim 1 wherein the coupling is attached to a fluid reservoir and the pressure drop across the inlet valve is at least about 10 bar.

3. The system of claim 2 wherein the pressure drop across the inlet valve is at least about 100 bar.

4. The system of claim 1 wherein the controller controls the temperature of the fluid at a point within the chamber.

5. The system of claim 1 further comprising an outlet valve for controlling the flow of fluid out of the chamber, wherein the controller also controls the outlet valve.

6. The system of claim 5 wherein the controller controls the rate of fluid flow through the chamber.

7. The system of claim 1 wherein the fluid entering the chamber from the reservoir substantially mixes with fluid already in the chamber before contacting the substrates.

8. The system of claim 7 further comprising a baffle, wherein the fluid flowing into the chamber is directed against the baffle.